THE RELATIONSHIP BETWEEN INTEREST RATE RISK MANAGEMENT AND PROFITABILITY OF COMMERCIAL BANKS IN KENYA.

BY

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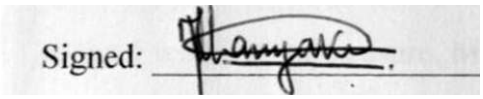
DECLARATION

This Research Project is my original work and has not been presented for a degree in any other university.

Signed:  Date: 15/11/2010

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Finally, all that we have and all that we are cannot be without the Grace and Blessings from our Heavenly Father, The Almighty God. To Him we give the Glory, Honour and Praise.

DEDICATION

This project is dedicated to my late father, Jason Thanyaku who sacrificed greatly to start me out in life with education as a foundation for the future and gave me the desire to achieve whatever good I aimed at.

ABSTRACT

Despite the rising importance of fee-based income as a proportion of total income for many banks. Net interest income remains one of the principal elements of bank net cash flows and after tax earnings. As a result, despite earnings diversification, variations in net interest income remain a key determinant of changes in profitability for commercial banks in Kenya. Currently the return on investments from treasury bills is low and banks are looking foi alternatives to invest their excess money. This has led to cheap financing as a result of too much liquidity in the economy which continues to drive down the interest rates. The progressive lowering of the signaling rate has led banks to reduce the interest rates on lending. Managing the profit margins in an environment where the central Bank of Kenya is pursuing a low interest rate regime is a hurdle to the commercial banks.

This study set out to determine the relationship between interest rate risk management and profitability of commercial banks in Kenya.Net interest income forms the biggest proportion of the banks overall income and this was observed for the 5-year period under study which was subsequently regressed against interest rate risk in each year. Interest rate risk was measured as the interest rate sensitivity gap between assets and liabilities maturing/repricing in time bands of less than three months, between three and twelve months and maturities in periods above one year. These three categories formed the independent variables for use in this study. The study found out there is a strong direct relationship between interest rate risk and the net interest income hence the earnings of commercial banks. Interest rate sensitivity gap movements accounted for 50.8% of variations in net interest income.

This shows that proper interest risk management not only reduces a bank's exposure to the risk but it also provides an opportunity to stabilize and improve

on their earnings resulting to higher profits. Overall, net interest income is increased by maintaining high positive long term sensitivity gaps in an increasing interest rate environment and low negative long term sensitivity in a declining interest rate environment.

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LIST OF ABBREVIATIONS.

ANOVA	- Analysis of variance
CBK	- Central Bank Of Kenya
NI	- Net Interest Income
OBS	- Off Balance Sheet
SPSS	- Statistical Package for the Social Sciences

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Wealth creation is one of the most important functions of commercial banks since they are able to perform the intermediation process by accepting deposits from the public and in turn advance loans (Kashyap et al 2002). Like other businesses they aim to make profits by charging an amount of interest on loans and advances to the borrowers of funds w hich is the primary source of their income. Interest income forms the bulk of earnings (about two thirds) while the remaining portion is from other fees (Kabiru, 2003). This shows how important it is for the commercial banks to manage the movements in interest rates since they derive the main source of their incomes from lending and securities portfolio that they hold (Opiyo, 2001).

Interest rate is the price paid by a borrower for the use of funds to the lender. Interest compensates lenders for the effects of inflation as well as for the risks they take. It's a measure of the cost of holding money as it reflects the opportunity cost of holding money. For a lender such as a bank, interest covers the costs of staying in business and also provides profits. Changes in interest rates can have adverse effects both on a bank's earnings and its economic value. Variation in earnings may reduces the earnings or involve outright losses which can threaten the financial stability of a bank by undermining its capital adequacy and by reducing market confidence (Basel committee 2001).

A bank's interest rate risk reflects the extent to which its financial condition is affected by changes in market interest rate. This is the current

or prospective risk to earnings and capital arising from adverse movements in interest rates. Interest rate risk can come in different forms which include repricing risk, yield curve risk and basis risk. A bank will face repricing risk if either the average yield on its liabilities is more sensitive to changes on market interest rates. Yield curve risk reflects the possibility that changes in the shape of the yield curve could have differential effects on the bank's assets and liabilities. Floating rate assets and liabilities that reprice at similar times and have different base rates for their instruments will subject the bank to a basis risk reflecting the possibility that the two base rate will diverge unexpectedly owing to differing credit risk or liquidity characteristics. Banks may also be subject to interest rate risk through interest sensitivity of their non-interest income e.g. mortgage interest. In practice a bank will generally have a mix of all these types of interest rate risk, with the effect potentially offsetting or reinforcing one another (English, W. 2002).

A successful financial risk management implementation goes through the stages of risk identification, risk measurement and risk management. Interest rate risk management is a comprehensive system for governing, monitoring and controlling unexpected variations in interest rates exposed to the banks (Li, 2003).Savers look at the rate of interest as an incentive to place their money in banks and other deposit taking institutions instead of investing their money in real estate, foreign Currency or other speculative activities. They seek to maximize their returns while ensuring a reasonable measure of security. Commercial banks, financial institutions and other credit providers seek to obtain deposits at low interest rates and lend at highest rates possible. But the government's main monetary policy objective is to create positive real interest rates and

stabilize nominal exchange rates so as to spur economic growth (CBK 2005).

The potential impact of changes in market interest rates on commercial banks' revenues, costs, and profitability has long been a concern of policy makers and bankers. A fairly traditional view of the operations of Banks is that they borrow short term and lend long term. That is banks engage in financial intermediation activities such that the maturity structure of their assets may exceed the maturity structure of their liabilities. Hence the bank's earnings and net worth could be negatively affected by unanticipated increases in interest rates. This exposure of the profitability and net worth of the bank due to unanticipated changes in interest rates is referred to as the interest rate risk (Robinson 1995).

The issue is that interest rates should be determined by market forces. Banks optimally offer debt contracts to depositors (deposit taking) and accept debt contracts from entrepreneurs (lending).Investors are paid real interest rates in a stable environment whereas in unstable environment, high rates are charged on deposits hence high interest rate risk exposure. Interest rate risk is the risk incurred by a financial institution when the maturities of its assets and liabilities are mismatched (Connert and Sanders 1999).

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By nature of their operations, Banks are potentially vulnerable to interest rates risk associated with the maturity mismatch structure of their assets and that of their liabilities as well as off-balance sheet positions that can result in volatility in income and value as interest rates changes (Kaysap el al 2002).

According to the Basel committee (2001), interest rate risk is the exposure of a banks financial condition to adverse movements of interest rates. Comptroller handbook (1997) defines interest rate risk as risk to earnings or capital arising from movements of interest rates that arise from differences between the timing of cash flows and the timing of rate changes. The use of treasury bill rate has emerged as a key determinant of high interest rates and a widening spread between the deposit rates and lending rates, however this does not address either the fact that there will be better rewards to savers and lower rates to borrowers. The bank should determine how sophisticated its management of interest rate risk should be .However a well managed bank will have a process that enables bank's management to identify, measure, monitor and control interest rate risk in a timely and comprehensive manner (Buttimer 2001).

Main types of interest rate risks are the basis risk which arises due to the mismatching of the interest rate basis for a company's assets and liabilities and gap risk which is a result of mismatch timings in rising interest rate sensitive assets and liabilities. Others include the repricing risk which arises from the difference between the timing of rate changes and the timing of cashflow. Interest rate risks results from the differences in maturities of a bank's assets and liabilities as a result of re-pricing mismatches occurring from either borrowing short-term to fund long term assets or borrowing long-term to fund slWrt-term assets (Wright and Houpt 1996). Interest rate risk can also arise from the imperfect correlation in the adjustment of the rates earned and paid on different instruments with otherwise similar re-pricing characteristics. The mismatches in the maturity of rate sensitive assets and liabilities i.e. the time to re-pricing an asset or liability whose interest rates will be changed

over some future period, results in volatility in income and value as interest rate changes (Hanweck et al 1984).

A bank's exposure to interest rate risk is measured by the difference between the duration of assets versus that of the liabilities both weighted in terms of dollars. The larger the difference, or the duration gap the more sensitive is the bank's shareholder value to changes in interest rates. Banks try to match the duration of their assets to that of their liabilities so as to hedge against this risk and for increased performance and profitability (Brewer 2001).

The pioneering study by Ho and Saunders(1981),starting from the conception of banking firms as mere intermediaries between lenders and borrowers, finds that bank's profit has two basic components namely the bank is exposed. This model has been extended in several studies including Allen (1998), McShane and Sharpe (1985) and Angbanzo(1997) to take into account other factors. Net interest margin is the difference between a bank's interest income and interest expense expressed as a percentage of interest-earning assets which is widely considered and often used as proxy for efficiency of financial intermediation (Demirgue, 1999).

This is the profit earned on loans and the margins varies across banks and countries which is as a result of issues like transaction costs, information asymmetries, regulatory inefficiencies as well as country's laws(Bae et al 2009). The results of analyzing the contribution of the different factors explaining the interest margin is useful in the design of specific measures of economic policy oriented towards specific aspects of banking business.

Overall a bank should ensure that its risk management policies are such that it does not hold low yielding investments in a high interest rate environment.

1.2 STATEMENT OF THE PROBLEM

Currently the return on investments from treasury bills is low and banks are looking for alternatives to invest their excess money. This has led to cheap financing as a result of too much liquidity in the economy which continues to drive down the interest rates. The progressive lowering of the signaling rate has led banks to reduce the interest rates on lending. Managing the profit margins in an environment where the central Bank of Kenya is pursuing a low interest rate regime is a hurdle to the commercial banks. Significant reduction in lending rates at a time when the deposits rates are already close to rock bottom can only squeeze the interest margins further.

Despite the rising importance of fee-based income as a proportion of total income for many banks, Net interest income remains one of the principal elements of bank net cash flows and after tax earnings. As a result, despite earnings diversification, variations in net interest income remain a key determinant of changes in profitability for commercial banks in Kenya. However research in the area of bank interest rate risk management is limited since the late 1980's when the savings and loan crisis brought the issue of interest-rate risk to the fore (Hanweck,2005).

The movement in interest rates affects a bank's earnings and book capital as a result of changes in net interest income and the market value of financial instruments which are a source of interest income. The net interest income of the bank, which is the excess of the interest received over the interest paid forms a big proportion of its earnings which needs

to be carefully managed. Changes in interest rates affects a bank's underlying economic value which in essence means that changes in interest rate affects the value of assets, liabilities and off-balance- sheet contracts since the cash Hows are changed. A bank ean alter its interest rate risk exposure by changing investments, lending, funding and pricing strategies together with managing the maturities and repricing of different portfolios to achieve a desired risk profile (Basel, 2001).

When there is adjustments of the interest rate paid and earned on different instruments, these differences can give rise to unexpected changes in the cashflows and earnings spread among assets, liabilities and off-balance sheet instruments of similar maturities. This can result to losses to the bank hence posing a risk to the expected income or earnings to the commercial banks. Banks seek to minimize their interest rate risk exposure by trying to match the maturities and repricing dates of their assets and liabilities. But some banks are willing to assume a greater level of interest rate risk and they may choose to take interest rate positions or leave them open (Mbai 2007).

The costs of achieving any given level of interest rate risk exposure could be high since adjusting the composition of a bank's portfolio could disrupt the banks underlying strategy. Moreover it might be difficult for a bank to adjust its interest rate risk exposure within a short period since certain portions of the balance sheet could be difficult to alter over a short time horizon. A number of studies (Robinson, 1995; Flannery,1981 &1983;Houpt and Embertsi, 1991) have examined the extent of bank's exposure to interest rate risk and also a number of local studies have examined commercial bank's exposure to interest rate risk (Khamis, 2007; Mwanza J,2007) but the greatest challenge for the Kenyan banking system today is how to cope with the liquidity overhang and the falling

interest rates. From the above there is need to determine the relationship between the management of interest rate risk and the profitability of commercial banks in Kenya since over 52% of the banks* net income is from interest income(Banking Supervision Report,2009).

Given the volume of interest rate transactions that are conducted daily within the banking sector, there is need therefore to establish the interest rate risk management techniques adopted in order to ensure that the commercial bank's returns are commensurate with proper management of this risk. To fill in this gap, this study seeks to establish whether a bank can stabilize and increase its net income by effective management of the interest rate risk.

1.3 OBJECTIVE OF THE STUDY

To determine the relationship between commercial banks interest rate risk management and their overall profitability.

1.4 SIGNIFICANCE OF THE STUDY

This study is expected to be of great importance and to bring key issues in interest rate risk management which if considered by the concerned in the banking sector will reduce bank's problems arising from improper risk management. But overall, the study will be particularly useful to the following:-

Commercial Banks

The success or failure of commercial banks depends on how well it buys and sells money (Ritter, Silber et al 1997).

Interest income is one of the main sources of a bank's earnings, manager's need to be careful on how profits can be maximized by managing the assets and liabilities in a way that increases income but does not expose their capital and earnings when the interest rates

flactuates. This is the focal point of this study and hence bank managers are expected to benefit a lot as vital information will be availed that will be useful in making better investment and product mix decisions to maximize on the bank's earnings.

Central Bank of Kenya

Being the regulator of the operations of commercial banks, the CBK aims at maintaining confidence in the monetary system through proper risk management system The central Bank of Kenya controls the interest rates by setting and monitoring the 91-day and 182-day treasury bill rates which are used by banks as their base lending rates. The CBK will benefit from this study as it will inform the bank in formulation of policies geared tow ards regulation of interest rates and management of interest rates risks by commercial banks in Kenya.

Depositors

They do provide a substantial proportion of funds to the banks and are interested on the amount of interest income they can realize from their savings as well as the stability of the banking institutions. They do expect the banks to avail funds to them for withdrawal as and when needed, and a level of confidence that their funds are safe and invested properly to maintain the bank in a profitable manner at the sarpe time avoiding solvency and liquidity risks. The study will help depositor's understand the relationship between the net interest margin and the various methods adopted by different banks in managing the interest rate risk so as to increase the income. This will help them in making choices on where to deposit their funds.

Shareholders

These are the owners and are interested on the returns to their investments. They are more concerned with the bank's solvency hence the study w ill be useful in highlighting the effects of interest rate risk management to capital and reserves which forms the bulk of the shareholders value. It will show the mechanisms used by banks to control and manage the interest rate risks and how profits can be maximized by proper risk management boosting their confidence in the banking an investment sector. This will give them an insight on how sound their investments are.

Academicians

This will provide a basis for further research in areas of interest rate risk management and profitability of commercial banks.

Prospective Investors

The study will provide vital information to investors in the banking industry as the will be able to evaluate the investments and product mix strategies adopted by commercial banks.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of the related literature on the subject under study presented by various researchers, scholars, analysts and authors. The researcher has drawn materials from several sources which are closely related to the theme and the objectives of this study. The chapter is organized as follows:- a brief overv iew of the banks' operations in the financial intermediation process, studies on interest rate risk w ith the first academic treatment of the subject by Samuelson(1945) and other studies emanating and subsequent reactions. Interest rate risk assessment, sources, effects and management is highlighted as well as the issue is handled in the Kenyan banking system.

2.2 Interest and other Bank's income

During 2000, Kenya proposed to reverse a period of financial liberalization by re-introducing regulated interest rates through the use of a treasury bill benchmark on lending rates, deposit rates and other supporting measures through the Central Bank of Kenya (amendment) Act 2010 popularly known as the Donde Bill. To meet the demands of their customers and communities as well as to^be able to execute business strategies, banks make loans, purchase securities and take deposits with different maturities and interest rates. These activities may leave a bank's earnings and capital exposed to movements in interest rates. This exposure is commonly known as the interest rate risk (Comptroller's Handbook, 1997).

Banks plays a significant role in the allocation of resources between various sectors of the economy. The role lies in the banks ability to intermediate between saving units and credit seekers in the economy. The two basic functions that banks perform in this intermediation process is that of brokerage and maturity transformation (Niehans. 1978). Financial intermediation is between the surplus spending units and the deficit spending units. Maturity transformation facilitates liquidity creation especially on the long-term side of the market. Ultimately savings are used to make investments that promote economic growth in areas like agriculture, jua kali sector, industry, tourism. Interest rate spread can either encourage or discourage the entry or expansion of Financial services into different sectors. The interest rate environment is important as it has influence on asset versus liability investment decisions of commercial banks since the dual purpose role of savings mobilization and lending are inseparable (Copperman et al 2000).

Commercial banks derive income primarily from lending and the securities portfolio. Since loans form a large proportion of the assets of commercial banks, interest and fees from loans are the largest source of their income. Other sources of income include service charges on deposits and income from various non- deposit related transactions. However, interest expenses especially on deposits is a big percentage of the bulk of total expenses which as an effect ori the overall profitability of the commercial banks (Kabiru 2003).

2.3 Term structure of interest rates

The term structure of interest rates compares the market yields of interest rates on securities assuming that all characteristics such as default risk and liquidity risk except for maturity are the same. This is shown in a yield curve. There are four common shapes of yield curves namely: - the upward sloping, the downward sloping, the humped yield curve and the Hat yield curve. Explanations for the shape of yield curve fall into three categories which are the unbiased expectation theory, the liquidity premium theory and the market segmentation theory. According to the unbiased expectation theory for the term structure of interest rates, at a given point in time, the yield curve reflects the market's current expectations of future short-term rates. Hence an upward -sloping yield curve reflects the market's expectations that the short-term rates will rise throughout the relevant period. A flat yield curve reflects the expectation that the short-term rates will remain constant over the relevant period. The theory argues that the long-term rates are a geometric average of current and expected future short-term interest rates.

The liquid premium theory is based on the idea that investors will hold long term maturities only if they are offered a premium to compensate for future uncertainty, which increases with asset's maturity. This theory states that the long-term rates are the geometric average of the current and f expected short-term rates plus a "liquidity" or risk premium which increases with maturity of the security.

Market segmentation theory posits that individual investors and financial institutions have specific maturity needs hence it doesn't consider securities with different maturities as perfect substitutes. Thus, interest

rates are determined by distinct supply and demand conditions within a particular market segment.

2.4 Interest rate risk

In general terms, commercial banks make profits by giving loans and purchasing securities with certain characteristics e.g. liquidity, risk, duration and return and applying the proceeds to acquire assets with a different set of characteristics. This is in pursuit of meeting the demands of their customers and to execute their business strategies. These activities may leave a bank's earnings and capital exposed to movements in interest rates. One of the major tasks of bank's management is how to manage the changes in Interest rate as it exposes the bank's financial condition adversely to interest rates risk (Basel committee 2001).

As defined by Wong (1995), interest rate risk is the exposure of a bank's current or future earnings and capital to interest rate change. Changes in interest rates can have adverse effects both on the banks earnings and its economic value. The impact could arise due to changes in the market interest rates on the value of bank assets, liabilities and off-balance sheet items. The traditional approach to interest rate risk assessment by banks focuses on the impact on changes in interest rates on accrued or reported earnings. Variations in earnings is an important focal point for interest rate risk analysis because reduced earnings or outright losses can threaten the financial stability of an institution by undermining its capital adequacy and by reducing market confidence (Basel Committee on Bank Supervision,2004).

Samuelson (1945) did the earliest studies on how the changes in interest rates affected the banking system. He stated that the value of a bank's equity is susceptible to changes in interest rates as a result of the structure

of its assets and liabilities. Hicks (1946) showed that the relative duration of various streams of payments plays a key role in determining the present value of these cash flows when the discount rate changes. This was further reinforced by a study done by Ho and Saunders (1981), with the idea of banks as mere intermediaries betw een lenders and borrowers and finds out that the profitability is dependent on the degree of competition in the market and the interest rate risk to which the bank is exposed.

Zarruk (1989) did an alternative theoretical model of bank's profitability to those which maximized their expected profits relying on the "costs of goods sold" approach. He introduces uncertainty to the model through the deposit supply function that contain a random element. He found out that under reasonable assumptions of decreasing risk aversion, the bank's spread increases with the amount of equity capital and decrease with deposit variability. Risk averse banks lower the risk of profit variability by increasing the deposit rate.

Madura and Zarruk (1995) posits that bank interest rate risk varies among countries which supports the need to capture interest rate risk differentials in the risk-based capital requirements. By introducing multiple sources of uncertainty to this proposition, Wong (1997) finds that size-preserving increases in the bank's with the mean-preserving increases in credit risk and interest rate risk have positive effects on the bank's profitability. Kaysap et al (2002) argues that commercial banks are engaged in two types of activities namely deposit taking and lending with interest rate risk being of major concern in their day to day operations.

2.5 Sources of interest rate risk

Interest rate risk can originate in a variety of forms which includes repricing risk, yield curve risk and basis risk (English,2002).The primary and most often discussed source of interest rate risk arises from timing differences in the maturity(for fixed rate) and repricing (for floating rate) of bank assets, liabilities and off-balance-sheet positions. A bank will face repricing risk if either the average yield on its assets or on its liabilities are more sensitive to changes in the market interest rate. This difference in sensitivity could reflect possible mismatches in the characteristics of the assets and the liabilities in that the fixed assets and liabilities could have different maturities. The sensitivity could also be due to floating rates assets and liabilities with different repricing periods, with base rates that have maturities similar to their respective repricing periods for example assets that reprice annually based on a one-year rate and liabilities that reprice quarterly based on a three-month rate(Wright and Houpt, 1996).

Yield curve risk reflects the possibility that change in the shape of the yield curve could have different effects on the banks assets and liabilities. This arises when unanticipated shifts of the yield curve have adverse effects on a bank's income or underlying economic value as a result of repricing mismatches. For instance, the underlying economic value of a long position in 10-year government security hedged by a short 5-year government notes could decline sharply if the yield curve steepens, even if the position is hedged against parallel movements in the yield curve (Basel committee, 2001).

Another important source of interest rate risk (commonly referred to as basis risk) arises from imperfect correlation in the adjustment of the rates

earned and paid on different instruments w ith otherwise similar repricing characteristics. When interest rates change, these differences can give rise to unexpected changes in the cash flows and earnings spread between assets, liabilities and OBS instruments of similar maturities or repricing frequencies.

Another source of interest rate risk arises from the options embedded in many bank assets, liabilities and OBS portfolios. Formally, an option provides the holder the right, but not the obligation, to buy, sell or in some manner alter the cash flow of an instrument or a financial contract. Options may exist as stand alone contracts that are traded on exchanges or are arranged between two parties or they may be embedded within loan or other investment products. Instruments with embedded options include various types of bonds and notes with call or put options, loans which give borrowers the right to prepay balances without penalty and various types of non-maturity deposit instruments that give depositors the right to withdraw funds at any time, often without penalties. If not adequately managed, the asymmetrical payoff characteristics of instruments with optionality features pose significant risk to a banking institution because the options held, both explicit and embedded are exercised at the advantage of the holder and to the disadvantage of the bank.

Moreover, an increasing array of options can involve significant leverage, which can magnify the influences (both positive and negative) of option Positions on the financial condition of a commercial bank.

2.6 Assessing and measuring interest rate risk

English (2002) observes that there are two different ways of assessing a banks interest rate risk. The first approach focuses on the impact of changes in the market interest rates on the value of bank assets, liabilities and off-balance sheet positions and so arrives at an overall assessment of the impact of changes in market interest rates on the economic value of the bank. I'he other one focuses on the implications of movements in market rates for the future cashflows that the bank will obtain. By considering the potential effect of rate changes on economic value as well as on earnings, banks are taking a longer-term perspective and considering the full effect of potential changes in market conditions. As a result they are more likely than before to avoid strategies that maximize current earnings at the cost of exposing future earnings to greater risk. Since the present discounted value of the bank's cashflows must equal the economic value of the bank, the two approaches are ideal and consistent for use in practice.

The risk measurement system should support a meaningful evaluation of the effect of stressful market conditions on the financial institution. Stress testing should be designed to provide information on the kinds of conditions under which the bank's strategies or positions would be most vulnerable and thus may be tailored to the risk characteristics of the

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individual bank. Possible stress scenarios includes abrupt changes in the general level of interest rates, changes in the relationships among key market rates (for example basis risk), changes in the slope and the shape of the yield curve i.e. yield curve risk, changes in the liquidity of key financial markets or changes in the volatility of market rates. In addition stress scenarios should include conditions under which key business parameters and assumptions break down (CBK. 2005).

Clearly a detailed information about the sources of the interest rate risk data and the pricing of the bank's assets and liabilities, including repricing periods and base rates is needed. A maturity and repricing table distributes assets, liabilities and OBS Positions into time bands according to the time remaining to repricing or maturity with the number and range of time bands according to their maturity(if fixed rate) or time remaining to their next repricing (if floating rate). Assets and liabilities that lack specific repricing intervals or maturities are assigned maturities based often on subjective judgements about the ability of the institutions to change or to avoid changing the interest rate it pays or receives. The table when completed is used as an indicator of interest rate risk exposure to earnings or economic value (Houpt and Embersit, 1991).

For evaluating exposure to earnings, a repricing table can be used to derive the mismatch (gap) between the amount of assets and the amount of liabilities that mature or reprice in each time period. By determining whether an excess of assets or liabilities will reprice in any given period, the effect of a rate change on net interest income can be roughly estimated. When this approach is used to assess the interest rate risk of current earnings, it is referred to as gap analysis. The size of the gap for a given time band,that is assets minus liabilities plus OBS exposures that reprice or mature within that time band gives an indication of the bank's repricing risk exposure. Maturity and repricing tables can be used in combination with risk weights derived from the price instruments to provide an estimate of the net change in the economic value of bank's assets, liabilities and OBS positions for a specific change in market interest rates (Houpt and Embersit, 1991).

Bank's may employ more sophisticated interest rate risk measurement systems such as simulation techniques which typically involve detailed

assessment of the potential effects of changes in interest rates on earnings and economic value by simulating the future path of interest rates and their impact on cashflows. This allows for an interaction of payment streams and interest rates which better captures the effects of embedded and or explicit options (CBK. 2005).

2.7 Effects of interest Rate Risk

2.7.1 Earnings perspective

This is the traditional approach as variation in earnings is the most critical point becausc reduced earnings or outright losses can threaten the financial stability of an institution by undermining its capital adequacy requirements as well as eroding market confidence. Both the interest and non-interest income are highly sensitive to market interest rates due to the fact that when interest rates fall, the bank experiences a decline in its fee income as well as the net interest income. This interest rate sensitivity has led bank's management to take a broader view of the potential effects of changes in market interest rates on banks earnings and to factor the broader effects into their estimated earnings under different interest rate environments (Kilongosi 2005).

2.7.2 Economic value perspective

The economic value of an instrument represents an assessment of the present value of its expected net cash flows, discounted to reflect market rates. Variations in market interest rates can also affect the economic value of a bank's assets, liabilities and OBS positions hence the sensitivity of a bank's economic value to fluctuations in interest rates is particularly an important consideration to shareholders, management and supervisors a like. By extension, the economic value of the bank can be viewed as the present value of its expected net cash flows, which is the expected cashflows on assets minus the expected cashflows on liabilities

plus the expected net cash flows on OBS positions. In this regard, the economic value perspective reflects one view of the sensitivity of the net worth of the hank to fluctuations in interest rates (Basel committee, 2001).

Since the economic value perspective considers the potential impact of interest rate changes on the present value of all future cash flows, it provides a more comprehensive view of the potential long- term effects of changes in interest rates that is offered by the earnings perspective. This comprehensive view is important since changes in near term earnings may not provide an accurate indication of the impact of interest rate risk movements on the bank's overall positions.

When evaluating the level of interest rate risk the bank is willing and able to assume, it should also consider the impact that past interest rates may have on future performance. In particular instruments that are not marked to market may already contain embedded gains or losses due to past rate movements. These gains or losses may be reflected over time in the bank's earnings. For instance, a long term fixed rate loan entered into when interest rates were low and refunded more recently with liabilities bearing a higher rate of interest will over its remaining life represent a drain on bank's resources (Basel committee, 2001).

2.8 Interest rate risk management (

Changes in interest rates affects a bank's earnings by changing its net interest income and the level of other interest-sensitive income and operating expenses. Excessive interest rate risk can pose a significant threat to a bank's capital base. Thus changes in interest rates can have adverse effects both on a financial institution's earnings, capital and its economic value. The goal of interest rate risk management is to maintain

a financial institution's interest rate risk exposure within self-imposed parameters over a range of possible changes in interest rates (CBK 2005).

Bank's use derivatives as end-users to hedge on- balance sheet risks and as dealers to increase non-interest revenue since they (derivatives) do provide an easy means for banks to alter their risk profile. This use of derivative contracts to hedge on interest rate risk enables banks to obtain further reduction in delegation costs and in turn allows bank to intermediate more effectively (Mbai 2007).Banks using interest rate derivatives, on average experience significantly higher growth in their commercial and industrial loan portfolios. This supports the idea that derivative usage help banks better cope with interest rate risk and thereby enable them to hold more loans to cam more income from their lending activity (Brewer et al, 2000).

By matching the interest rate exposure of the liabilities to that of their assets, banks can reduce the variability of their cash flows by closely matching the maturity of their assets and liabilities for instance issuance of a debt contract that is correctly aligned with the desired interest rate exposure (Froot et al, 1993). Banks also hedge against interest rate risk by preferring interest payments on their liabilities that are on a floating rate if cash flows are positively correlated with interest rates and pay fixed

y

interest payments when cash flows are either uncorrected or negatively correlated with interest rates (Graham et al, 2002).

Jegadeesh and Pennachi (1996) observed that management of interest rate is a critical factor for the success of financial institutions and corporations. Prompted by the increased volatility and deregulation of interest rates in Europe in 1980's, a weak array of financial instruments were introduced to cater for the growing risk management needs.

Willem (1995) argues that in the more developed countries, sophisticated techniques have been created through which the risk inherent in maturity transformation can be minimized such as duration analysis.

Sound interest rate risk management involves the application of four basic elements in the management of assets, liabilities and OBS instruments. These includes: appropriate board and senior management oversight, adequate risk management policies together with procedures and limits, appropriate risk measurement and monitoring functions, and comprehensive internal controls and independent audits (CBK,2005).

The board of directors has the ultimate responsibility for understanding the nature and the level of interest rate risk taken by the bank. They should therefore formulate and approve broad business strategies and policies that govern or influence the interest rate risk as well as approving the overall policies and ensuring that management takes the necessary steps to identify measure, monitor and control this risk. It is also their responsibility to ensure there provision of clear guidance regarding the level of interest rate risk acceptable to the bank (CBK, 2005)

The board should also review information that is sufficient in detail and timeliness periodically to allow them understand and assess the performance of the senior management in monitoring and controlling interest rate risk in compliance with lines of responsibility and accountability over interest rate risk management decisions and should clearly define authorized instruments, hedging strategies and position taking opportunities, identify the types of instruments and activities that the bank may employ or conduct. This acts as a means through which the board can communicate their tolerance of risk on a consolidated basis and at different legal entities, identify quantitative parameters that define the

level of interest rate risk acceptable by the bank and where appropriate such limits should be further specified for certain types of instruments, portfolio and activities. Specific procedures and approvals should also be necessary for exception to policies and limits. Prior to introducing a new product, hedging or position taking strategy, management should ensure that adequate operational procedures and risk control systems are in place (CBK, 2005).

Proposals to undertake new instruments or new strategies should contain a description of the relevant product or strategy, an identification of the resources required to establish sound and effective interest rate risk management of the product or activity coupled with an analysis of the reasonableness of the proposed activities in relation to the financial condition and capital levels and the procedures to be used to measure, monitor and control the risks of the proposed product or activity. Financial institutions must have adequate information systems for measuring, monitoring, controlling and reporting interest rate exposures. Reports should include any violation of approved responsibilities by managers when taking interest rate risk exposures or investing in un-approved instruments, excesses over approved interest rate limits and any exceptions highlighted by the internal auditor (CBK 2005).

2.9 Managing interest rate risk

Kenya has experienced attempted actions to control interest rate through an Act of Parliament. The Act became law in August 2001 and in 2003 the then Financc minister brought the Act in operation through various aspects such as, requirements that a borrower stops repayment once its clear that the loan is not performing and the interest charge equals the principal. The publication of the minimum and maximum lending rates in local press by the CBK is also a requirement of the Act. The Act requires

nominal interest rate to be pegged to the 91-day treasury bill rate maintaining a constant margin between the lending rates and deposit rates.

Since borrowers are not w illing to pay more, banks are bringing down interest rates charged on loans and chasing retail business (retail portfolio in particular personal lending) which has enormous opportunities for expansion compared with corporate loan segment. This seems to be the response adopted by commercial banks in Kenya in an effort to sustain their intermediation profit margins as these new strategies continues to boost their incomes despite the changing circumstances. The engine that is driving the retail push is the consumer loans, home and car loans, and personal loans which account for over 50 percent of the loan book. While corporate lending remains a risk venture, banks are exploring the retail segment where loans are given for consumption and normally with minimal formality in securing collateral where the good debt income ratio on the part of the borrower should not exceed 40 percent (Banking survey 2008).

The uncertainty posed by the "Donde Act" caused banks to find a new niche in fees and commission to grow their revenues. This strategy has paid off as fees commission income has progressively grown as individuals and institutions have seen the importance of using banks to pay their bills since this is convenient and secure to both parties. The success of a bank is primarily due to its ability to generate returns in excess of its costs of funds, some banks are building compensating portfolios to offset loses in low- yielding investments and others have kept a tight lid on expenses with right sizing schemes whittling away at staff costs (Banking Survey 2008).

Mbai (2006) did a study on the relationship between interest rate and net interest income of commercial banks in Kenya and found out that net income increases when high positive medium term sensitivity gaps are maintained in a rising interest rate environment and conversely low negative medium term sensitivity gaps in a falling interest rate environment. This is clear that there is a direct relationship between interest rate risk and net interest income of commercial banks in Kenya and it was consistent with the Ho and Saunders (1981), where both the Net short-term assets and Non-maturing deposits remain strong influencing factors to the variations in the net interest income of commercial banks.

Kilongosi (2005) did a study on Net bank interest margin and interest rate risk among commercial Banks and found out that there was a significant relationship between the net short term assets, non-maturing deposits and the treasury yield with the net interest income.
This shows that from studies carried out there is need for effective management of the interest rate risk by commercial banks in Kenya.

2.10 Measure of Commercial Banks' profitability

According to Copperman et al (2002), the following are the performance measures for commercial banks:

Operating efficiency (

i) Net interest margin (N1M)

This is the net interest income as a percentage of investment securities and loans. It is an important indicator of the quality of asset /liability management. The higher the NIM the more profitable the bank is.

$$NIM = \frac{\text{Interest on assets-interest cost on liabilities}}{\text{Total assets}}$$

(ii) Non-interest expense to non-interest income

This is the non-interest expense as a percentage of non-interest revenue.

$$\frac{\text{Non-interest expense}}{\text{Non-interest income}}$$

.Profitability indicators

They include the following-:

A) Return on total Assets (ROTA)

This is the income after taxes as a percentage of book value of total assets. It compares income to revenues and to average total assets. It is viewed as a comprehensive measure of profitability, indicating the shilling return per shilling of assets held by the bank. ROTA is determined by asset utilization and profit margin.

$$\text{ROTA}=\frac{\text{Net income after tax}}{\text{Total Assets}}$$

(B) Return on Equity

This is the net income after taxes as a percentage of book value of total equity.

$$\text{ROE}-\frac{\text{Net income after taxes}}{\text{Equity}}$$

Apart from the interest rate risk management, a bank's profitability will also be affected by the strategies that the management will adopt in

managing its credit risk, liquidity management as well the non-interest revenues.

2.11 Chapter Summary

Unanticipated changes in interest rates are viewed as risks to the banks which need to be managed well. This is due to the fact that banks normally borrow short and lend on long term basis. Empirical evidence and data from financial statements prov ides support that interest rate risk 1.1 banks e.vibts. Banks' market value is more sensitive to changes in interest rate spreads in the long run. This study sought to contribute to the existing literature by establishing whether effective management of interest rate risks by commercial banks' can increase their overall profits.

CHAPTER THREE

3. O RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the method which was used in data collection; in this case secondary data will be used from the published financial statements of the commercial banks. The population used is a census survey of all the 43 registered and operating commercial banks in Kenya. The data collected was then analysed through a multiple regression analysis.

3.2 Research Design

The research is an empirical study carried out as a census survey of commercial banks' registered and operating in Kenya as of 31st December 2009.The study investigated the relationship between the interest rate spread and the profitability of commercial banks in Kenya.

3.3 Population and sample

The population of interest in this study consisted of commercial banks registered and licensed under the Banking Act in Kenya as of 31st December 2009.There are 43 commercial banks currently operating in Kenya and a census survey of all commercial banks was carried out.

3.4 Data Collection

The study used secondary data derived mainly from the records of NSE, published financial statements of quoted commercial banks for the 5-year period 2005-2009.These were supplemented with data from various government publications such as the Central Bank of Kenya-Annual Bank Supervision Report and the Central Bureau of Statistics data

(Economic Surveys).The 5 year period was selected because hanks are required to prepare interest rate risk tables that reflect assets and liabilities maturing or being repriced in I month to 3 months,3 months to 6 months.6 months to 1 year. 1 year to 5 years and from 5 years and over. The quarterly disclosures will enable the study identify relevant data for both loans and deposits. Historical data on bank interest margins was calculated from the published annual reports and accounts of these firms for the period under review.

3.5 Data Analysis

This study used multiple regression technique in data analysis. Regression is used when a researcher is interested in finding out whether an independent variable predicts a given dependent variable. Multiple regression attempts to determine whether a group of variables together predict a given dependent variable. In this study, the net interest income for each period was regressed against three independent variables. These are the Interest rate sensitivity Gap for assets and liabilities maturing in less than 3 months (IRSG 1), Interest rate sensitivity Gap for assets and liabilities maturing between 3 and 12 months (IRSG 2) and Interest rate sensitivity Gap for assets and liabilities maturing beyond 1 year (IRSG 3). The regression equation used in this study is:

$NI=a+p,(IRSG\ 1)+p_2(IRSG2)+p_3(IRSG3)+€$

Where

NI is the net interest income of a given bank

u is the value of interest income when IRSG is zero(when the total Asset's in each category is exactly equal to total liabilities in that Category hence no duration gap.

B 1,23 These are the regression coefficients or change induced in net interest income by each IRSG

IRSG 1,2,3 These are the interest rate sensitivity gaps in the categories of assets and liabilities maturing in less than 3 months(IRSG1), between 3 and 12 months (IRSG 2) and more than 1 year(IRSG3)

£ This is the error term

The multiple regression correlation coefficient (R), was used to determine the nature of relationship, while the coefficient of determination (R^2) was used to determine the strength of the relationship. This shows the proportion of changes in commercial banks profitability as a result of interest rate sensitivity gaps.

The duration gap is a widely used measure of interest rate risk that estimates respective changes in the value of assets and liabilities in response to an interest rate shock. This gap reflects the repricing frequency of assets and liabilities as well as the value of imbedded call options (Mays, 1999). This provides a measure of risk by calculating the specific interest cash flows of the bank for a given interest rate scenario. Net interest income is used as a measure for the profitability of banks as a larger portion of their assets is advances both to corporate and consumer loans. This cumulatively generated over 52% of the total income for the banks for the financial period ending December 2009 (Banking Supervision Report, 2009). /

CHAPTER FOUR

4.0 DATA ANALYSIS AND FINDINGS

4.1 Introduction

The data analysis was guided by the research objective presented in chapter one. The body of the report only contains information that directly relates to the study objectives while the appendices contain other information and statistics used in preparing the report. The main method used for data analysis was multiple regression analysis. Banks are required to prepare interest rate risk tables that reflect assets and liabilities maturing or being repriced in one month to three months, three months to six months, six months to one year, one year to five years, and from five years and over.

However different banks exhibit different levels of disclosure of the repricing/ maturity periods of their assets and liabilities. Due to the differences in the levels of disclosure, three definitive repricing/maturing periods of bank assets and liabilities are obtained and data stratified on this basis. These are assets and liabilities repricing/maturing in less than three months, assets and liabilities repricing/maturing in between three and twelve months and assets and liabilities repricing/maturing in more than one year. The less-than-three months repricing/maturing category is in tandem with the 91-day treasury bill and is thus useful in determining the level of net interest income derived from lending and investments which are based on the 91-day treasury bill rates. The three-twelve months category reflects the one year bond and other short and medium term investments. The over one year category represents mainly long-term loans and other investments.

4.2 Regression Results

4.2.1 Overall model summary

Net interest income (NI) for each year for each bank was regressed against three independent variables namely: Interest Rate Sensitivity Gap for assets and liabilities maturing/repricing in less than three months (IRSG 1),Interest Rate Sensitivity Gap for assets and liabilities niaturing/Repricing in between three and twelve months (IRSG 2) and Interest Rate Sensitivity Gap for assets and liabilities maturing/repricing in more than one year(IRSG 3).Regression analysis was conducted using SPSS version 17.Correlation tests were also estimated using the same package.

The results obtained from the regression analysis are presented and discussed below. This section restricts itself to the overall model results (tables 1-4).Other detailed analyses of the model regression results are discussed in section 4.2.2.

Table 1: Overall Model Summary

R	R^2	Adjusted R^2	Std Error Of Estimate
.713[a]	.508	.347	3231.70554

[a]. predictors:(constant),IRSGl,IRSG2.IRSG2

Source: Research Data

The multiple regression correlation coefficient, R of 71.3% indicates that there is a strong positive relationship between net interest income and interest rate risk. This implies that banks can stabilize their earnings by effective interest rate risk management. The coefficient of determination,

R^2 of .508 indicates that 50.8% of variations in net interest income is explained by interest rate sensitivity gaps. To get the actual variation in net interest income for the entire population of commercial banks in Kenya, we determine the adjusted R^2, which is 0.347 and it implies that the interest rate sensitivity gaps variables explain 34.7% of the variations in net interest income of commercial banks in Kenya.

Table 2: Overall Model Analysis Of Variance (ANOVA)"

	Sum of Squares	**df**	**Mean Square**	**F**	**p-value**
Regression	**216,000,000**	**3**	**71943247.9**	**6.889**	**.0010**
Residual	**533,000,000**	**51**	**10443920.70**		
Total	**748,000,000**	**54**			

a Predictors:(constant),IRSG 1 ,IRSG2,and IRSG3 (millions)

b Dependent Variable: Net Interest Income (NI) (millions)

Source: Research Data

F-ratio was used to test the goodness of fit of the regression model in predicting net interest income using interest rate sensitivity gaps. This was computed using analysis of the variance (ANOVA) as shown in Table 2.The F-ratio was computed as the quotient of the regression and the residual mean squares, at 6.889. The F-value is statistically significant at $p < .001$ (last column of the table), implying that there is a less than 0.1% chance that the F-ratio would happen by chance alone. Any probability value below 0.05 is statistically meaningful and this is regarded as indicative of genuine effect (Field, 2005). We can therefore conclude that interest rate sensitivity gaps predict interest income

significantly well, and that the relationship between net interest income and interest rate sensitivity gaps is genuine.

Table 3: Overall Model Coefficients

	B	Std **Error**	t	**p-value**
(Constant)	2689.984	536.052	5.018	0.000
IRSG1	0.013	0.052	1.099	0.000
IRSG2	0.184	0.091	1.503	0.000
IRSG3	0.477	0.028	3.677	0.001

Dependent Variable: Net Interest Income (NI) (millions)

Source: Research Data

The above table (Table 3) shows that all the explanatory variables IRSG1,IRSG2 and 1RSG3 positively and significantly explain the net interest income since the p-value in all cases are less than 0.005 at 5% Level of significance. The t statistic for the coefficients indicate that each coefficient is not only big relative to its standard error, but also statistically different from zero, implying that a unit increase in interest rate sensitivity gap results in increase in net interest income. Interest rate sensitivity gap for assets and liabilities maturing/repricing beyond one year is the largest contributor to net interest incpome. A unit increase in this gap results in 0.477 increase in net income. Since the values in the study were expressed in millions, it means that an increase in the gap by Kshs 1,000,000 results in Kshs 477.000 increase in net income. A unit increase in short term sensitivity gap (maturities in less than three months) results in 0.013 increase in net income, while a unit increase in mid term sensitivity gap (maturing in more than three months but less than one year) results in 0.184 increase in net interest income

The regression relationship between the net interest income and the interest rate sensitivity gap can thus be modeled as follows:-

Nl=2689.984+0.013(IRSG 1) +0.184(IRSG2) +0.477(IRSG3).

The model predicts that if a bank's assets and liabilities in all the three categories mature/reprice in the same proportion and time, hence implying no sensitivity gap, the bank can make a net interest income of Kshs 2.67 billion from its interest earning assets and interest bearing liabilities regardless of the movement in interest rates. The model further shows that additional net interest income can be generated by maintaining positive sensitivity gaps in each of the three categories in an increasing interest rate environment. High sensitivity gaps in short term assets results in low net interest income. These results imply that banks should take deposits that are callable in more than one year and should hold more than proportionate investments in one year treasury bonds and medium term loans and bonds in an increasing interest rate environment. However this situation should be reversed in a declining interest rate environment.

Table 4: Correlations Matrix

		IRSG1	IRSG2	IRSG3
IRSG1	Pearson correlation	1	0.132	-0.352**
	P-value	.	0.337	0.008
IRSG2	Pearson Correlation	0.132	1	0.171
	P-Value	0.337	.	0.213
IRSG3	Pearson Correlation	-0.352**	0.171	1
	P-value	0.008	0.213	.

** Correlation is significant at the 0.01 level (2-tailed test)

The correlation matrix above shows that there exists a negative and significant relationship between short term and long term gaps (Pearson correlation **coefficient**=-0.302,p-value=0.008<0.01 at 1% level **of** significance).This means that the higher the interest rate sensitivity gap in short term assets and liabilities, the lower interest rate sensitivity gap in long term assets and liabilities. The matrix indicates that it takes more than a year for short-term mismatches in a bank's assets and liabilities to be corrected. Since the highest amount of net interest income is achieved when long term gap is the highest, banks should focus on portfolios in this category.

4.2.2 Regression by Year

Table 5: Regression summary by year

Year	*R*	R^2	*Adjusted* R^2	*Std error of the estimate*	*Dublin Watson test*
2005	0.954	0.911	0.873	910.66581	2.269
2006	0.814	0.662	0.517	2086.56434	2.093
•2007	0.750	0.562	0.432	3656.61845	1.978
2008	0.825	0.680	0.543	2909.53496	2.393
2009	0.763	0.582	0.403	3706.50654	1.965

Predictors :(Constant), IRSG1, IRSG2, IRSG3

Source: Research Data

The year-on year model summary in table 5 indicates that the model variables well explained net interest income in years 2005, 2008 and 2006 where the coefficient of determination was 91.1%, 68% and 66.2% respectively. Durbin Watson test was used to test for serial correlations between standard errors of the estimates to find out, if these were auto-correlated. The test static can vary between 0 atfd 4 with a value of 2 meaning that the residuals are uncorrelated (Field, 2005).The observed values of the static were approximately 2, and thus the conclusion that there was no correlation between the standard errors.

CHAPTER 5

5.0 SUMMARY OF FINDINGS, CONCLUSIONS, RECOMMENDATIONS, LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

5.1 Summary of Findings and Conclusions

5.1.1 Summary of findings

The study set out to determine whether there is a relationship between commercial banks' interest rate sensitivity gap and profitability. At the outset, the net interest income being the biggest contributor to the overall income was reviewed. Its models, factors influencing it, interest rate risk, measurement and the management was reviewed to analyze the effects of all these to the net interest income.

Net interest income observed in a period of five years was regressed against interest rate sensitivity gaps of assets and liabilities in each year. The interest rate sensitivity gap was stratified into three definitive categories, that is, maturing in less than three months, maturing in-between three months and one year, and those maturing in periods above one year. These three categories formed the independent variables for use in the study. It is clear from the study that ther^is a direct relationship between interest rate risk and profitability (net interest income) of commercial banks in Kenya. Interest rate sensitivity gaps accounts for 50.7% of variations in net interest income. Each of the three categories of interest rate sensitivity gap was found to positively contribute to net interest income.

Finally the study found that the higher the short term sensitivity gap. the lower the long term gap and vice versa, implying that it takes more than a year for short mismatches in assets and liabilities to be corrected.

5.1.2 Conclusions

The regression and correlation analysis used by this study provides a definitive evidence of existence of a strong relationship between interest rate risk and net interest income and hence the overall profitability of commercial banks. 1 he study has demonstrated the fact that proper interest rate risk management not only reduces a bank's exposure to risk but it provides an opportunity to stabilize and improve on their incomes. An appropriate mix of a banks" assets and liabilities in terms of their maturities/repricing frequencies helps moderate the effects of changes and volatility in short term interest rates on the overall net interest income which if utilized properly by banks can work to their advantage.

Net interest income increases when high positive long term sensitivity gaps are maintained in a rising interest rate environment and conversely low negative long term sensitivity gaps in a falling interest rate environment. Banks should focus their interest rate management policies on this asset/liability holding pattern in a volatile interest rate environment. Maintaining a zero sensitivity gap is„ a risk-averse approach as it ensures a bank's earnings and capital are protected from fluctuations in interest rates but it does not provide an opportunity to increase its net interest income by taking advantage of the interest rate fluctuations.

In conclusion, the banks can maximize their net interest income and hence their overall earnings if they take deposits that are callable in more than twelve months while holding more than proportionate investments in one year bonds or if the deposits arc taken to finance long term loans and

other one year interest earning assets in an increasing interest rate environment. However this situation should he reversed in a declining interest rate environment.

5.2 Recommendations

Banks should try and achieve a perfect mismatch in maturities (if fixed rate) or time remaining to their next repricing (if floating rate) of their assets and liabilities. This will help in streamlining the banks operations by adjusting the portfolio of assets and liabilities to lake profits when interest rate rises and equally avoid losses when the rates fall. Hie study has shown that each of the sensitivity gaps results to a positive contribution to net interest income, if interest rate rises. The contribution is highest in the over one year gap. There are no good benefits in the shorter term periods.

Banks must establish and enforce operating limits and other practices that maintain exposures within levels consistent with their internal policies. They should also measure their vulnerability to loss under stressful market conditions and consider those results when establishing and reviewing their policies and limits for interest rate risk. The banks information system should be designed in a manner that ensures effective measuring, monitoring, controlling and reporting of interest rate sensitivity gaps. Banks' internal policies and limits should ensure that there exists a high positive long term sensitivity gap in an increasing interest rate environment and a low negative term sensitivity gap in a declining interest rate environment. Management should ensure that their guidelines and regulations are in line with the above.

Banks and their supervisors need to remain alert to developments that could lead to excessive exposure to changes in market interest rates. The

aim should be to turn the exposures into opportunities for increasing the bank's revenue.

5.3 Limitations of the study

The study was conducted using financial data derived from financial statements of commercial banks. Such data is subject to manipulation by management to suit their needs.

Data availability was a major shortcoming particularly from the privately owned banks as the interest rate sensitivity gap is disclosed in the notes to the accounts and most of this data was missing for years 2005 and 2006 as most banks disclosed only that information that enable them meet the minimum bare statutory reporting requirements and this means its not possible to calculate the interest rate sensitivity gaps with the kind of data availed by the banks.

Also banks grouped their categories of the maturity/repricing of their assets differently. The interest rate risk tables were not similar and hence the need to stratify data and restrict it into the three time bands.

5.4 Suggestions for further research

Given the fact that risk management is a fundamental part of commercial banks operations, a research can be conducted to find out whether commercial banks have managed to diversify psks through other income generating sources not related to interest rates for example fee income and other incomes.

A study could also be done to take into account the interaction between interest rates risk and other risks for example credit risk, liquidity risk, foreign exchange risk. This should seek to determine the combined effect of these risks on the banks overall income.

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APPENDICES

APPENDIX 1:

LIST OF COMMERCIAL BANKS REGISTERED AND OPERATING IN KENYA AS AT 31st DECEMBER 2009.

1. AFRICAN BANKING CORPORATION LTD
2. BANK OF AFRICA LTD
3. BANKOFBARODA
4. BANK OF INDIA
5. BARCLAYS BANK OF KENYA
6. CFC STANBIC BANK LTD
7. CHASE BANK LTD
8. CITIBANK N.A
9. CITY FINANCE BANK LTD
10. COMMERCIAL BANK OF AFRICA LTD
11. CONSOLIDATED BANK OF KENYA LTD
12. COOPERATIVE BANK OF KENYA LTD
13. CREDIT BANK LTD
14. DIAMOND TRUST BANK LTD
15. DEVELOPMENT BANK OF KENYA LTD
16. DUBAI BANK LTD „
17. ECOBANK BANK LTD (
18. EQUATORIAL COMMERCIAL BANK LTD
19. EQUITY BANK LTD
20. FAMILY BANK LTD
21. FIDELITY COMMERCIAL BANK LTD
22. FINA BANK LTD
23. FIRST COMMUNITY BANK LI D

24.GIRO BANK LTD

25.GUARDIAN BANK LTD

26.GULF AFRICAN BANK LTD

27.HABIB AG ZURICLI

28.HABIB BANK LTD

29.1&M BANK LTD

30.IMPERIAL BANK LTD

31 .KENYA COMMERCIAL BANK LTD

32.K-RLP BANK LTD

33.MIDDLE EAST BANK LTD

34.NATIONAL BANK OF KENYA LTD

35.NIC BANK

36.ORIENTAL COMMERCIAL BANK

37.PARAMOUNT UNIVERSAL BANK LTD

38.PRIME BANK LTD

39.SOUTHERN CREDIT BANKING CORPORATION LTD

40.STANDARD CHARTERED BANK

41.TRANS-NATIONAL BANK LTD

42.UBA KENYA BANK LTD

43.VICTORIA COMMERCIAL BANK LTD

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APPENDIX 2:Detailed **year-on-year interest rate sensitivity gaps and net interest income**

Note.All amounts are in Kenya Shillings 'Millions'

BARCLAYS BANK OF **KENYA**

	Description	Algebra	In the study	2005	2006	2007	2008	2009
Independent variable 1:	1-3 months sensitivity gap	XI	IRSG1	20,963	(4,049)	(7,421)	(25,154)	2,857
Independent variable 2:	3-12 months sensitivity gap	X2	IRSG2	5,821	4,803	387	(5,069)	15,531
Independent variable 3:	Over lyear sensitivity gap	X3	IRSG3	(277)	8,226	11,293	4,993	8,685
Dependent variable	Net interest income	**Y**	**Nl**	**8,388**	**8,936**	**11,381**	**14,010**	**14,770**

CO-OPERATIVE BANK

Independent variable 1:	1-3 months sensitivity gap	XI	IRSG1	(4,881)	(2,958)	5,655	(10,168)	(19,504)
Independent variable 2:	3-12 months sensitivity gap	X2	IRSG2	2,084	5,020	1,805	3,467	6,325
Independent variable 3:	Over 1 year sensitivity gap	X3	IRSG3	8,399	22,015	(31,483)	44,430	52,863
Dependent variable	Net interest income	**Y**	**Nl**	**2,841**	**3,339**	**4,849**	**5,695**	**7,054**

CONSOLIDATED BANK

Independent variable 1:	1-3 months sensitivity gap	XI	IRSG1	205	(803)	(128)	490	1,639
Independent variable 2:	3-12 months sensitivity gap	X2	IRSG2	150	232	(161)	(509)	(1,506)
Independent variable 3:	Over 1 year sensitivity gap	X3	IRSG3	343	1,245	1,547	1,679	2,277
Dependent variable	Net interest income	**Y**	**Nl**	**260**	**209**	**318**	**368**	**515**

DIAMOND TRUST BANK

Independent variable 1:	1-3 months sensitivity gap	XI
Independent variable 2:	*3-12* months sensitivity gap	X2
Independent variable 3:	Over 1 year sensitivity gap	X3
Dependent variable	Net interest income	**Y**

EQUITY BANK

Independent variable 1:	1-3 months sensitivity gap	XI
Independent variable 2:	3-12 months sensitivity gap	X2
Independent variable 3:	Over 1 year sensitivity gap	X3
Dependent variable	Net interest income	**Y**

FINA BANK

Independent variable 1:	1-3 months sensitivity gap	XI
Independent variable 2:	3-12 months sensitivity gap	X2
Independent variable 3:	Over 1 year sensitivity gap	X3
Dependent variable	Net interest income	**Y**

IRSG1	(4,335)	(4,510)	(6,024)	(7,059)	(7,140)
IRSG2	(2,545)	(1,937)	(4,601)	(8,830)	(17,993)
IRSG 3	43	3	1,356	(319)	2,292
Nl	**811**	**1,079**	**1,721**	**2,439**	**3,520**

IRSG1	1,674	6,391	12,403	(2,211)	(6,468)
IRSG2	2,602	1,675	3,352	3,283	4,764
IRSG3	(4,447)	2,421	8,585	26,711	33,671
Nl	**865**	**1,508**	**2,660**	**5,952**	**8,278**

IRSG1	(540)	(469)	(2,117)	(2,662)	(1,481)
IRSG2	730	806	312	(1,897)	2,235
IRSG3	1,007	1,226	3,778	165	1,042
Nl	**428**	**527**	631	**859**	**969**

IMPERIAL BANK

Independent variable 1:	1-3 months sensitivity gap	XI
Independent variable 2:	3-12 months sensitivity gap	X2
Independent variable 3:	Over 1 year sensitivity gap	X3
Dependent variable	Net interest income	**Y**

KENYA COMMERCIAL BANK

Independent variable 1:	1-3 months sensitivity gap	XI
Independent variable 2:	3-12 months sensitivity gap	X2
Independent variable 3:	Over 1 year sensitivity gap	X3
Dependent variable	Net interest income	**Y**

NATIONAL BANK OF KENYA

Independent variable 1:	1-3 months sensitivity gap	XI
Independent variable 2:	3-12 months sensitivity gap	X2
Independent variable 3:	Over 1 year sensitivity gap	X3
Dependent variable	Net interest income	**Y**

IRSG1	(2,358)	(1,468)	1,337)	(1,542)	(2,616)
IRSG2	(1,779)	(1,190)	(2,606)	(2,467)	(1,752)
IRSG3	58	(19)	(385)	(83)	10
Nl	**521**	**770**	**941**	**1,365**	**1,161**

IRSG1	(47,154)	(4,275)	(3,561)	(2,571)	(4,241)
IRSG2	3,232	7,180	2,182	2,441	(12,035)
IRSG3	40,667	38,228	59,317	44,946	58,148
Nl	**4,766**	**7,737**	**5,897**	**10,546**	**12,368**

IRSG1	(11,688)	(6,332)	(4,873)	(4,304)	(7,463)
IRSG2	84	1,216	887	(285)	2,156
IRSG3	21,370	20,300	6,637	4,000	6,925
Nl	**3,218**	**3,950**	**2,918**	**2,961**	**3,332**

NIC BANK

Independent variable 1: 1-3 months sensitivity gap
Independent variable 2: 3-12 months sensitivity gap
Independent variable 3: Over 1 Year sensitivity gap
Dependent variable Net interest income

STANDARD CHARTERED BANK OF KENYA

Independent variable 1: 1-3 months sensitivity gap
Independent variable 2: 3-12 months sensitivity gap
Independent variable 3: Over 1 year sensitivity gap
Dependent variable Net interest income

X I	IRSG1	(9,510)	(8,025)	(7,752)	(15,819)	(16,788)
X2	IRSG2	2,037	2,861	5,196	(1,193)	(1/467)
X3	IRSG3	3,415	5,265	6,320	825	392
Y	**Nl**	**1,169**	**1,455**	**1,640**	**2,015**	**2,414**

X I	IRSG1	673	(4,069)	(6,941)	(10,302)	4,134
X2	IRSG2	(104)	5,023	1,378	7,293	11,160
X3	IRSG3	22,796	7,622	10,923	28,836	10,450
Y	**Nl**	**4,578**	**5,129**	**5,595**	**6,119**	**7,724**